

Open Treatment of Ankle Fracture as an Inpatient Increases the Risk of a Complication

Frank Avilucea, MD¹; Paul Whiting, MD¹; Sarah Greenberg, BA¹; Amir Jahangir, MD²; Basem Attum, MD¹; Hassan Mir, MD, MBA¹; William Obrebsky, MD, MPH²; Manish Sethi, MD²;

¹Vanderbilt University Medical Center, Nashville, Tennessee, USA;

²Vanderbilt Orthopaedic Institute, Nashville, Tennessee, USA

Purpose: Ankle fractures are one of the most common injuries treated by orthopaedic surgeons with a rate of 187 per 100,000. It remains unclear whether there is increased risk of a postoperative complication following inpatient versus outpatient treatment of these injuries. We utilized the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database to compare the 30-day complication rates between inpatient versus outpatient surgical management of ankle fractures.

Methods: Using the ACS-NSQIP database from 2006 to 2013, we conducted a retrospective analysis of prospectively collected patient demographics, comorbidities, and 30-day complications of isolated open treatment of ankle fractures. A propensity-matched dataset using an 8 to 1 greedy matching algorithm in a 1:1 ratio was created to control for differences in preoperative demographics and comorbidities across inpatient and outpatient groups. A multinomial logistic regression model was used to assess the odds of minor (superficial wound infection, pneumonia, and urinary tract infection) and major (deep wound infection, organ space infection, myocardial infarction, stroke, pulmonary embolism, deep venous thrombosis, sepsis, septic shock, and death) postoperative complications within 30 day following open treatment, adjusting for duration of surgery.

Results: 7383 patients were identified with 2630 (36%) in the outpatient and 2630 (36%) in the inpatient group. Overall, 104 (4.0%) inpatients versus 52 (2.0%) outpatients developed a complication ($P < 0.001$). Inpatients developed major complications, including deep wound infection ($P = 0.032$) and pulmonary embolism ($P = 0.004$), and minor complications, including superficial wound infection ($P = 0.026$), pneumonia ($P = 0.014$), and urinary tract infection ($P = 0.027$), at a higher rate. As shown in Table 1, inpatient treatment was also associated with increased odds of developing a minor, major, or any complication.

Table 1. Rate of Complications for Inpatients vs. Outpatients with Ankle Fractures

	Minor Complications	Minor: Odds ratio (95% CI, p-value)	Major Complications	Major: Odds ratio (95% CI, p-value)	Total Complications	Total: Odds ratio (95% CI, p-value)
Inpatient (N=2,630, 36%)	68 (2.6%)	1.86 (1.23-2.82) p=0.003	45 (1.7%)	2.14 (1.19-3.82) p=0.011	104 (4.0%)	1.94 (1.39-2.73) p<0.001
Outpatient (N=2,630, 36%)	35 (1.3%)	Reference	20 (0.8 %)	Reference	52 (2.0%)	Reference

Conclusion: Even when controlling for comorbid conditions, undergoing open treatment of an ankle fracture as an inpatient has two-fold increased odds of developing a complication within 30 days. Multivariate analysis corroborates inpatient status as an independent risk factor for such a complication. In a future bundled payment system, orthopaedic trauma surgeons need to be aware of the factors influencing complications.

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.